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Validation Studies of Statistical Parametric Mapping(SPM) Using Basal Ganglia Brain Phantom Data Obtained with SPECT

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INTRODUCTION

The purpose of this study was to validate statistical parametric mapping of activity changes in basal ganglia using basal ganglia brain phantom data obtained with CeraSPECT™.

METHOD

The basal ganglia brain phantom was scanned with CeraSPECT™ after filling 6.58:1, 4.68:1, and 1.86:1 ratios between basal ganglia and the remaining brain area with Tc-99m. The projection data were obtained 7 images at different positions for each ratio. The data were then reconstructed with or without attenuation and scatter correction. The reconstructed data were analyzed by statistical parametric mapping(SPM) software after converting the CeraSPECT™ data to Analyze (Mayo Foundation, Baltimore, MD, USA) header format. The header format of the CeraSPECT™ data includes 4096 bytes of header, 1.67mm of x and y pixel size, 3.34mm of slice thickness, and 2 bytes of signed integer of pixel values. The data were realigned, normalized to PET template(MNI template: Monterol Neurological Institution Template), and smoothed with 8mm FWHM prior to SPM analysis. The statistical analysis between combinations of ratios were performed for a single subject, 2 conditions, proportional scaling, scaling of overall grand mean of 50, and contrast 2. The statistical results were displayed and rendered for increase with p value of 0.05 and uncorrected extent threshold p value of 0.5 for SPMZ. For the graphics of the results, sections were displayed as sagittal, coronal, transverse slice with hot color map.

RESULTS

The reconstructed data were successfully realigned, normalized to the PET template, and smoothed. The basal ganglia were clearly visualized with p value of 0.05 for SPMZ when the true activities in the basal ganglia were increased.

DISCUSSION

The results showed that SPM can detect activity changes in basal ganglia and map them into three-dimensional anatomical space. Therefore, SPM software was useful in the localization of the basal ganglia region.

CONCLUSION

The validation studies using phantom data will convince that SPM is a useful tool for anal

yzing neurological SPECT data.